NATURAL RESOURCES CONSERVATION SERVICE

CONSERVATION PRACTICE STANDARD

SPRING DEVELOPMENT

(No.)

CODE 574

DEFINITION

Utilizing springs and seeps to provide water for a conservation need.

PURPOSES

This practice may be applied as part of a resource management system to support one or more of the following purposes:

- Improve the distribution of water.
- Increase the quantity and quality of water for livestock, wildlife, or other uses.
- Obtain water for irrigation if water is available in a suitable quantity and quality.

CONDITIONS WHERE PRACTICE APPLIES

In areas where spring or seep development will provide a dependable supply of suitable water for the planned times of use and where the intended purpose can be achieved by using this practice alone or combined with other conservation practices.

CRITERIA

General Criteria Applicable to All Purposes

Laws, rules, and regulations. This practice shall conform to all federal, state, and local laws, rules, and regulations. Laws, rules, and regulations of particular concern include those involving water rights, land use, pollution control, property easements, wetlands, preservation of cultural resources, and endangered species.

An investigation of site conditions, including soil borings, shall be made. Water quality shall be determined to the extent required for the intended purpose. Water quantity shall be measured from existing flows, as practicable, to determine if the development will meet requirements.

Fracture and tubular springs. This type of spring is associated with cavernous rock. If water issues from rock fractures, the individual openings shall be cleaned and enlarged, as needed, to improve flow. The water from these individual openings shall be collected by means of tile or perforated pipeline or by a gravel-filled ditch. The collection works shall be constructed an adequate distance below the elevation of the openings to permit free discharge.

If water issues from a single opening, such as a solution channel in a soluble rock formation, the opening shall be cleaned or enlarged as needed. A collection system usually is not required.

If a spring box or sump is used, it shall be installed at an elevation low enough that water yield is not restricted.

Perched or contact springs. Perched or contact springs occur when an impermeable layer lies beneath a water-bearing permeable layer. Collection trenches shall be used to intercept and divert flows from the water-bearing formation.

Artesian springs. Artesian springs normally occur at a fissure or break in the impervious stratum with the water source being an under-lying pervious water-bearing layer so positioned that the water surface elevation (water table) is always above the outlet point of the spring. Remove obstructions, clean or enlarge joints or fractures, or lower the outlet elevation as needed to improve flow. Sumps or spring boxes shall be located as needed. Free outlet discharge or minimum restriction to the spring

flow is required to protect and maintain yield.

Collection systems. If a collection trench is used, the trench shall be excavated so that it extends into (but not through) the impervious layer. Minimum length of the trench shall be based on site conditions, preferably the entire length of the water-bearing outcrop.

A cutoff wall shall be constructed along the downstream side of the trench (if needed) to ensure that the flow enters the collection system. The cutoff wall may be constructed of plastic sheeting, well-tamped clay, masonry, concrete, or other impervious materials.

The collection system shall consist of subsurface drainage tubing or perforated pipe not less than 4 inches in diameter, a wood box drain, or other suitable manufactured system. Surrounding the collector with geotextile fabric or a sand-gravel filter is recommended. Cleanouts are recommended for all collection systems.

Crushed rock or gravel backfill that is not less than 1 foot thick may be used as a collection system if site conditions warrant, in lieu of other materials.

Sand, gravel, and crushed rock shall be composed of clean, hard, durable particles.

Spring boxes. Spring boxes (if needed) shall be made of plastic, concrete, or other durable material. They shall have a tight access cover and impervious floor. A “shoebox” type access cover (a cover with an edge projection overhanging the sides) or manhole attachment, with gasket, is recommended for tightness. The floor may be omitted when the underlying material is stable and impervious.

The boxes shall have a minimum cross-sectional area of 1½ ft^2, and the floor of the box shall be not less than 6 inches below the outlet of the collection system.

Spring box overflows, if needed, shall meet the requirements found in Conservation Practice Standard 614, Watering Facility.

Riser - flush valve system. On installations where 3 or less collection lines are used, a 4-inch diameter riser may be used in place of a spring box at the junction point of the collection lines. The riser should be capped and vented. In addition, a flushing valve must be installed in the delivery line below the stock tank or point of water delivery. Usually the valve is located 30 to 40 feet below the inlet pipe entrance to the tank to allow for sediment storage in the line. This will allow for flushing of the system after initial installation. After the sediments have been flushed out of the system, the valve can be closed and the tank filled. The overflow pipe from the tank is connected to the drain line below the flushing valve. Refer to Figure 1, "Spring development livestock tank with flush valve," which shows a typical riser-flush valve installation.

In order for the system to operate properly, it is essential that the flushing valve be opened periodically and the lines flushed out.

There must be sufficient vertical drop through the system to allow for head loss through the riser, delivery line, and other fixtures and also to fill the stockwater tank.

Outlets. The outlet pipe from a spring box shall be placed not less than 6 inches above the floor (to provide a sediment trap). The spring outlet pipe should be at the same elevation or lower than the collector pipe outlet to prevent reduced spring flow. The intake to the outlet pipe shall be screened as necessary and installed to the box with a watertight connection.

The outlet pipe must have positive grade away from the spring box or collection system unless vent pipe(s) are added to prevent air locks

The outlet pipe shall have a minimum diameter of 1¼ inches. In lieu of site-specific spring flow and pipe vent calculations, the outlet pipe shall have a minimum size as follows, based on line grades:

1. 1¼ inches inside diameter for line grades greater than 1 percent.
2. 1½ inches inside diameter for line grades greater than or equal to 0.5 percent but less than or equal to 1 percent.
3. 2 inches inside diameter for line grades less than 0.5 percent.

Minimum outlet pipe material and strength requirements shall equal those found in Conservation Practice Standard 516, Pipeline.

Tanks or troughs. Refer to the Conservation Practice Standard 614, Watering Facility, for details on stockwater requirements and site

preparation and installation of tanks and troughs.

Appurtenance protection. Measures shall be included to protect appurtenances from damage by freezing, flooding, sedimentation, contamination, vehicular traffic, and livestock.

Wildlife habitat protection. Spring developments with the potential to jeopardize wetlands, bogs, fens, or other unique ecological sites shall be designed with measures required to maintain the existing habitat, unless acceptable mitigation is provided. A functional assessment will be made at potential spring development areas to determine existing ecological functions and/or potential losses.

Operation and maintenance plans for ecologically sensitive sites shall include specific valve installation and operation requirements to protect existing site habitat values.

Vegetative establishment. Establishing vegetation on disturbed areas shall be in accordance with Conservation Practice Standard 342, Critical Area Planting.

CONSIDERATIONS

Considerations when determining the suitability of a site for development shall include the need and feasibility of protection from contaminants; potential damage to cultural resource areas, wetlands, woody cover, and existing wildlife habitat; and potential changes in surface water flow.

A shutoff valve and vent system on the spring outlet pipe should be considered for winter shutdown, flow control, and maintenance.

Native vegetation adapted to wet conditions may be used as an alternative to introduced grasses on some wet sites.

If a spring box is not used, consideration should be given for an access point and a cleanout method for supply and delivery lines.

When geotextile envelope systems are used for collection, the soils and likely turbid installation conditions at the site should be evaluated in the selection of the geotextile to be used.

PLANS AND SPECIFICATIONS

Plans and specifications for installing spring developments shall be in keeping with this standard and shall describe the requirements for applying the practice to achieve its intended purpose.

OPERATION AND MAINTENANCE

The operation and maintenance plan shall include such items as winter freeze and flooding protection, overflow and valve operations, erosion, spring box sediment removal, rodent damage repair, vegetative cover and stable outlet maintenance, and other site-specific items as needed.

Operation and maintenance plans for ecologically sensitive sites shall include specific valve installation and operation requirements to protect existing site habitat values.

The plan should provide for periodic inspections and prompt repair or replacement of damaged components.

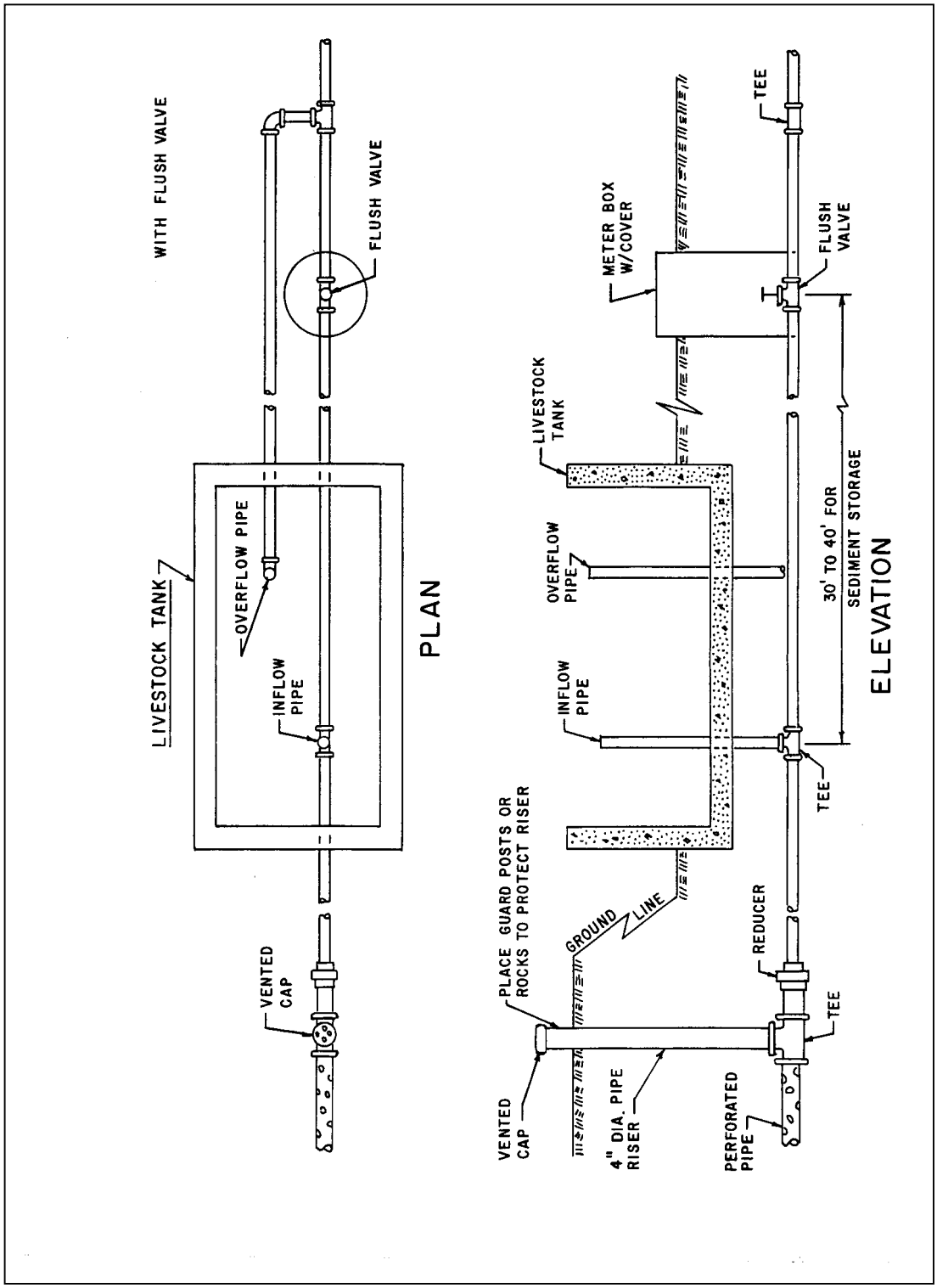

Figure 1 - Spring development livestock tank with flush valve